SECOND-GROWTH PROBLEMS[1]

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Most of the timber cut in the eastern half of the United States is second growth of one form or another, and even in the West second-growth Douglas-fir and ponderosa pine are being cut commercially, some mills cutting nothing else. Experience over the years and investigations at the Forest Products Laboratory have revealed a number of differences between second-growth and old-growth timber. Although a sharp line cannot always be drawn between second growth and old growth, it is recognized that second growth in general has characteristics which differ materially from those of old growth. In a number of respects second-growth is inferior, but in a few it is better than virgin growth.

The following are some of the differences between second-growth and old-growth timber. As a rule, second-growth trees are smaller when cut, have more taper, yield a lower percentage of clear lumber, have wider sapwood and produce little or no edge-grained lumber. The wood is coarser textured, in softwoods is more likely to contain pronounced compression wood, and in hardwoods is more difficult to work and shrinks more on account of its greater density.

On the other hand, second-growth timber usually contains smaller knots, has less pronounced spiral grain because spiral grain increases in slope with diameter, has less heart rot, frequently is stronger in hardwoods -- a desirable property for most uses of hickory, ash, elm, and some oak -- is harder and wears more smoothly, and is more readily pulped and treated with preservatives on account of the small percentage of heartwood it contains.

In fact, second growth of some species, notably Eastern white pine, baldcypress, and yellow-poplar, is so different from old growth that it is not used or suitable for the same purposes.

With the fast-approaching exhaustion of virgin timber and greater refinements in wood utilization, the need for continued and more exacting

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investigation of second growth is apparent. While in some cases information obtained on one species may be applied to another, the large number of species entering into the lumber markets makes necessary a well-rounded store of information on each species, if it is to be used most advantageously.

Investigations of the characteristics of second growth should have two objectives. The first is to determine the characteristics and properties of wood so that it can be marketed and used to best advantage. For example, engineers should know how the strength of second growth varies and how it compares with that of old growth. Timberland owners and sawmill operators should know more about the percentage of different grades of lumber produced by second growth. Pulp mill executives should know about its pulping characteristics. Smaller timber also presents new problems in handling, especially in mechanizing operations. Furthermore, smaller sizes of trees require different methods of utilization either by using smaller sizes on the job or fabricating larger sizes from smaller pieces. On account of the larger percentage of sapwood in second growth the quest for cheaper and more efficient preservative methods will become more urgent. Those who season lumber will want to know how to reduce degrade due to knots, and tendency to cup and twist, which often is greater in second growth. The cutting of veneer from the relatively small second-growth logs presents new problems in technique. As competition becomes more keen, the selection of wood for specific uses will require greater refinements, and these in turn will be complicated by the wide variations to which young timber is subject.

The other objective in research on second-growth timber is to determine the quality of wood produced under different growth conditions in order that foresters can manage young stands so that the best possible wood consistent with economical procedure may be obtained. In the past practically all the emphasis in growing timber has been on producing as great a volume as possible per acre. More attention needs to be paid to quality production. In old growth there always has been an excess of low-grade timber. In second growth there will be an even greater surplus unless forest management practices are oriented towards producing better lumber and utilization practices are modified so that more low-grade lumber can be used efficiently.

Some important results have already been obtained along these lines at the Forest Products Laboratory. It has been shown that strong Southern pine timber cannot be produced unless the trees have sufficient soil moisture available during summer to produce adequate amounts of summerwood -- no use trying to produce dense timber on well-drained sandy soil. Hickory, ash, and hardwoods must maintain a good rate of growth throughout their life if they are to produce strong wood all the way out to the bark. Certain species growing in the southern swamps, particularly ash, water tupelo, and cypress, produce swelled butts with light, spongy wood which has undesirable properties; whereas cedar elm growing under similar conditions produces normal wood throughout the trunk.

Although there are no handle factories in Wisconsin, second-growth white ash in this State was found to have adequate toughness for handles, which presages possible new local industries. Open-grown sugar maple is much denser than forest grown -- in fact, the density is similar to that of

dogwood -- and it seems to make a satisfactory substitute for that species for shuttles. The conditions favoring the development of compression wood, which is produced on the lower side of leaning softwood trees, its properties, and methods for its detection by laymen have been studied so that timber growers and users can be made aware of the seriousness of its deficiencies. The Laboratory is now studying the characteristics of eccentric growth in hardwoods. Time does not permit going into further detail, but it may be said that there are many problems in the relationship of growth conditions to wood quality that should be investigated if maximum returns from timberlands and maximum satisfaction from timber products are to be obtained.

The forester has a number of factors under his control that can be used to improve the quality of the timber he is growing. Some of these are: (1) choice of species to favor on a particular site and for specific uses, the choice being based on the probable intrinsic value of the second growth produced under certain conditions rather than on the reputation of the old growth; (2) density of stand which greatly affects rate of diameter growth with all of its influences on properties, taper, knottiness, size at a given age, percentage of heartwood, etc.; (3) reduction in injuries by fire, insects, and logging; and (4) pruning.

This is a large field for investigation requiring the combined efforts of field and laboratory organizations. When one considers the differences in price of lower and upper grades of lumber and the large percentage of low grade produced by most second growth even a slight improvement in wood quality through improved-management research along these lines should be a profitable undertaking.